CLAIMS

What is claimed is:

1. A method comprising:
initiating detection of a characteristic of a communication channel;
using the characteristic of the communication channel within a processing unit to configure data transmission along the communication channel in one of a first mode wherein upstream data transmission and downstream data transmission are sent in substantially non-overlapping frequency domains, and a second mode wherein upstream data transmission and downstream data transmission are sent in substantially overlapping frequency domains.

2. The method of claim 1 wherein the first mode is a frequency division multiplexed mode (FDM) that uses at least one filter and the second mode is an echo cancellation mode that uses echo cancellation processing.

3. The method of claim 1 wherein the characteristic is a data capacity of the communication channel.

4. The method of claim 1 wherein the characteristic is a noise level of the communication channel.

5. The method of claim 1 wherein the characteristic is a geographic location of circuits connected to the communication channel.

6. The method of claim 1 wherein the characteristic is a user defined input.

7. The method of claim 1 wherein the characteristic is a physical length of the communication channel.

8. The method of claim 1 wherein the characteristic is an amount of power received across the communication channel.

9. The method of claim 1 wherein the communication channel communicates discrete multi-tone (DMT) data.

10. The method of claim 1 wherein the method of claim 1 is performed during the training period of a multi-carrier digital communication system.

11. The method of claim 1 wherein the communication channel is processed occasionally during transmission to determine if the first and second modes should be changed between one another over time.

12. The method of claim 1 wherein the communication channel communicates data via a plurality of frequency bins wherein the bins are segmented into a plurality of groups, the groups being prioritized so that bins associated with the first mode are utilized before the bins associated with the second mode.

13. The method of claim 12 wherein higher-frequency non-overlapped bins are used first, followed by overlapped frequency bins that accommodate both upstream and downstream data, followed by frequency bins that accommodate plain old telephone service (POTS) information.

14. A method for allocating data for transmission along a communication channel, the method comprising:

setting a desired communication rate for the communication channel;

allocating at least a first portion of the data to a non-overlapped frequency spectrum for transmission over the communication channel; and

allocating at least a second portion of the data to an overlapped frequency spectrum of the communication channel when the non-overlapped frequency spectrum cannot accommodate the desired communication rate.

15. The method of claim 14 wherein the desired communication rate is changed to a lower data communication rate if the desired communication rate cannot be obtained.

16. The method of claim 14, further comprising allocating at least a third portion of the data to a plain old telephone service (POTS) frequency spectrum of the communication channel when the non-overlapped frequency spectrum and the overlapped frequency spectrum cannot accommodate the desired communication rate; and communicating the data once the desired data rate has been achieved, wherein the desired communication rate is changed to a lower data communication rate in order to avoid allocation of data to the POTS frequency spectrum.

17. The method of claim 14 wherein the desired communication rate is changed to a lower data communication rate in order to avoid allocation of data to the overlapped frequency spectrum.

18. A method of allocating data in a multi-carrier communication system, the method comprising:

receiving a desired data rate;

receiving priority frequency region data;

receiving a characteristic measurement sequence used to determine capacity information for a communication channel;

incrementally allocating data among a plurality of available frequency regions of the communication channel based upon the priority frequency region data and the capacity information to accommodate the desired data rate; and

communicating data once the desired data rate has been accommodated.

19. The method of claim 18 wherein the desired data rate is dynamically changed to ensure that only certain portions of the available frequency spectrum are utilized for data transmission.

20. A method for transmitting data over a communication line, the method comprising the steps of:

configuring the communication line for transmission in a frequency division multiplex manner wherein upstream data transmission and downstream data transmission are sent in substantially non-overlapping frequency domains;

communicating data for the transmission in the frequency division multiplex manner;

detecting changing line conditions;

reconfiguring the communication line for transmission in an echo cancellation manner wherein upstream data transmission and downstream data transmission are sent in overlapping frequency domains; and

continuing to communicate data for the transmission in the echo cancellation manner.

21. The method of claim 20 wherein the changing line conditions progress to a point where the step of reconfiguring must use POTS frequency spectrum to communicate data for the transmission.

22. A method of configuring a communication channel, the method comprising:

comparing a line length of the communication channel to a threshold; and

determining whether to transmit data over a frequency overlapped region of the communication channel based on the comparison.

23. The method of claim 22, wherein when the line length exceeds the threshold, data is communicated over the overlapped region of the communication channel.

24. The method of claim 22, wherein when the line length is less than the threshold, data is communicated over a non-overlapped region, but not over the overlapped region, of the communication channel.

25. A method comprising the steps of:

detecting the channel length of a communication channel;

configuring, when the line length is greater than a channel length threshold, to transmit data on the communication channel without using a high frequency region; and

configuring, when the channel length is less than a channel length threshold, to transmit data on the communication channel using the high frequency region.

26. A method of configuring a communication channel, the method comprising:

receiving a mode priority and frequency region list at a first transceiver;

determining characteristics of the communication channel; and

configuring a training sequence based on the channel characteristics and the priority and frequency region list.

27. The method of claim 26, wherein the channel characteristics are selected from the group consisting of channel length, requested data rate, user input, deployment geography, channel noise, frequency response, impedance, and capacity.

28. A method of configuring a communication channel of a multi-carrier overlap-enabled digital communication system, the method comprising:

determining a capacity for a plurality of different frequency regions of the communication channel;

transmitting the capacity for each of the plurality of different frequency regions over the communication channel; and

communicating data over the communication channel.

29. The method of claim 27, wherein at least one of the plurality of different frequency regions is an overlapped region.

30. A method of configuring a communication channel of a multi-carrier overlap-enabled digital communication system, the method comprising:

receiving capacity information for a plurality of different frequency regions of the communication channel;

communicating a data rate request over the communication channel, the data rate request determined as a function of the received capacity information.

31. A method of configuring a communication channel of a multi-carrier overlap-enabled digital communication system, the method comprising:

receiving capacity information for a plurality of different frequency regions of the communication channel; and

determining a data rate request, the data rate request determined as a function of the received capacity information.

32. An apparatus comprising:

a processing unit, the processing unit determining a channel characteristic of a communication channel;

a filter responsive to the processing unit; and

a line driver in communication with a communication channel;

wherein the filter and the line driver are dynamically configured by the processing unit to communicate over a particular set of frequency regions of the communication channel in response to the channel characteristic determined by the processing unit.

33. The apparatus of claim 32, wherein the characteristic is a channel length and the processor configures the filter and line driver to communicate in a non-overlapped region of the channel and where the filter and line driver are dynamically

configured in response to input from an external source, the external source including user input and a far end transceiver message.

34. The apparatus of claim 32, wherein the characteristic is a channel length and the processor configures the filter and line driver to communicate in an overlapped region or a plain old telephone service region of the channel.

35. A computer readable device, the device comprising:
at least one computer executable routine to:
allocate data for transmission along a communication channel;
set a desired communication rate for the communication channel;
allocate at least a first portion of the data to a non-overlapped frequency spectrum for transmission over the communication channel; and
allocate at least a second portion of the data to an overlapped frequency spectrum of the communication channel when the non-overlapped frequency spectrum cannot accommodate the desired communication rate.